Solve 1-step equations

Notes and guidance

In this small step, children look at solving equations formally for the first time. At first, they might find the notation a bit confusing, but encourage them to consider equations as a different way of writing "missing number" problems.
For example, $x + 5 = 12$ is the same as _____ + 5 = 12

It is useful to begin by looking at "think of a number" questions, such as "Mo thinks of a number, adds 7 and gets the answer 20. What was his original number?" and relating this to the equation $n + 7 = 20$. Similarly, you can build on earlier learning using function machines, relating finding an input for a given output to solving the corresponding equation. In both cases, children should see that using inverse operations helps to solve the equations.

Things to look out for

- Children may not use the inverse operation to solve an equation, for example $x + 3 = 5$, so $x = 8$

- Children may think that the values of letters are permanently fixed. For example, having solved an equation for x, they may apply this value for x to a different equation.

Key questions

- What does the expression $3x$ mean?
- If you know 3 times the value of a number, how can you use this to work out the number?
- How can you represent the problem as a bar model?
- How can you represent the problem as an equation?
- What is the inverse of _____ ?
- What does the bar model show?
  What can you use it to work out?
- How can you draw a function machine to represent the equation?
  How does the function machine help you to solve the equation?

Possible sentence stems

- The inverse of _____ is _____
- If _____ has been added to a number to give _____ , then to work out the number I need to _____ from _____
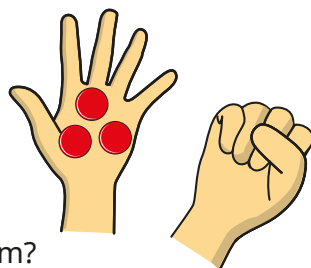
National Curriculum links

- Express missing number problems algebraically

Solve 1-step equations

Key learning

- Ben has 9 counters altogether.

  He has 3 counters in his left hand and c counters in his closed right hand.

  Which equation represents this problem?

  | $c - 3 = 9$ | $3c = 9$ | $c + 3 = 9$ | $c = 9 + 3$ |

  How many counters does he have in his closed hand?

- Fay thinks of a number.

  She adds 9 to her number.

  She gets the answer 15

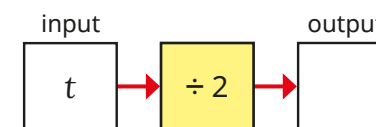 What was her original number?

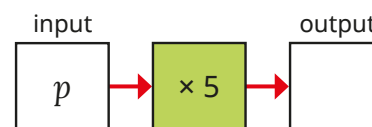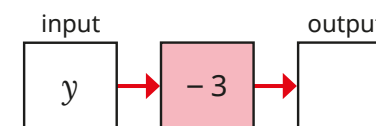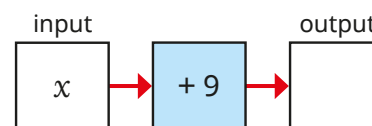 Explain how the equation $x + 9 = 15$ represents this problem.

- Dan thinks of a number and multiplies it by 3 to get the answer 12

  Which equation shows this?

  | $3x = 12$ | $3 + x = 12$ | $x - 3 = 12$ | $x \div 3 = 12$ |

  What was Dan's original number?

- Write expressions for the outputs of the function machines.

  input → x → + 9 → output

  input → y → − 3 → output

  input → p → × 5 → output

  input → t → ÷ 2 → output

  If the output of all the machines is 20, write and solve equations to find the values of the letters.

- Write an equation to represent each bar model.

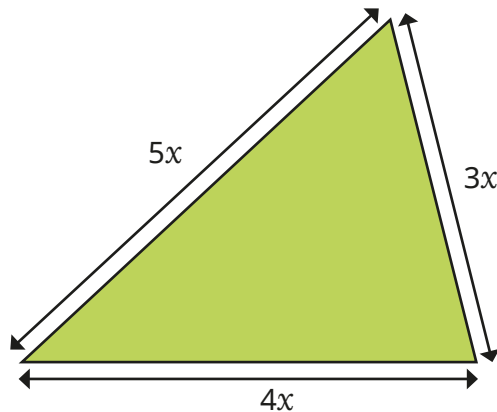 Then find the value of x for each one.

  | 15 |
  | x | x | x |

  | 12 |
  | x | 7 |

- Solve the equations.

  | $3x = 21$ | $y + 5 = 11$ | $z - 6 = 8$ | $p \div 3 = 10$ |

Solve 1-step equations

Reasoning and problem solving

The perimeter of the triangle is 216 cm.

$5x$

$3x$

$4x$

Form an equation to find the value of x.
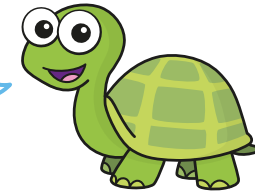
Work out the lengths of the sides of the triangle.

$12x = 216$

$x = 18$

54 cm, 72 cm and 90 cm
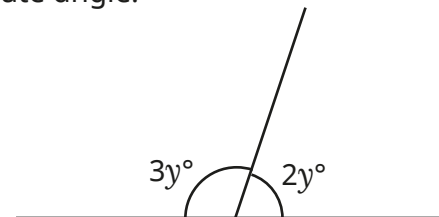
$x - 9 = 0$

This means that x must equal zero.

Do you agree with Tiny?

Explain your answer.

No

Work out the size of the acute angle.

$3y°$ $2y°$

How can you check your answer?

72°